

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

PEM0044 – ESSENTIAL MATHEMATICS

(All sections / Groups)

15 OCTOBER 2019
2.30 p.m. - 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages with 4 questions only, excluding the cover page.
2. Answer all **FOUR (4)** questions.
3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.
4. The formula sheet is attached at the end of this question paper.

Question 1 (25 Marks)

- (a) Simplify the following expression.

(i) $\frac{(3x^2y^7)^2}{3x}$

[2 marks]

(ii) $\sqrt[3]{\frac{2}{m^2n}}$

[4 marks]

- (b) Solve the following equation and inequality.

(i) $5(3x+1) + 2(x-2) = 4x+3$

[3 marks]

(ii) $2(x+3) \leq -4(x-2)$

[3 marks]

- (c) Use the quadratic formula to solve the following equation.

$$x^2 - x - 2 = 0$$

[6 marks]

- (d) Find an equation of the straight line that passes through point (5, 2) and (8, 1). Then, sketch a graph.

[7 marks]

Continued...

Question 2 (25 Marks)

- (a) Given that $A = \begin{bmatrix} 1 & 4 \\ 2 & 7 \end{bmatrix}$, and $B = \begin{bmatrix} -2 & -4 \\ 3 & 0 \end{bmatrix}$. Find $A^T + 3B^T$.

[5 marks]

- (b) Consider the following system of equations.

$$x + 2y + z = 2$$

$$x + 4y + z = 4$$

$$5x + y + 2z = 1$$

- (i) Write the system of equation above in a form $Ax = B$.

[3 marks]

- (ii) Find A^{-1} .

[14 marks]

- (iii) Find the value of x, y and z .

[3 marks]

Question 3 (20 Marks)

- (a) Given the arithmetic sequence is 27, 22, 17,

- (i) Find the first term and the common difference.

[3 marks]

- (ii) Find the sum of the first 11 terms.

[3 marks]

- (b) The seventh term of an arithmetic sequence is 20 and the sum of the first ten terms is 155. Find the common difference.

[7 marks]

- (c) Given the geometric sequence is 81, 27, 9,

- (i) Find the 12 term.

[4 marks]

- (ii) Find the sum of the first 50 terms.

[3 marks]

Continued...

Question 4 (30 Marks)

- (a) Find $f'''(x)$ if $f(x) = 3 - x^2 + x^3 - 2x^4$.

[6 marks]

- (b) Find the first derivative of the following functions. Simplify your answer.

(i) $f(x) = (x+4)\left(\frac{2x^2+1}{2x-1}\right)$

[9 marks]

(ii) $f(x) = \frac{9}{\sqrt[3]{x^2 + \pi}}$

[4 marks]

- (c) Evaluate the following indefinite integrals:

(i) $\int \left(\frac{2}{x^3} + 1 - 3\sqrt[3]{x^2} \right) dx$

[5 marks]

(ii) $\int 4x^3 \sqrt{1+x^4} dx$

[6 marks]

End of Page.

Summary of Formulas

1. Basic Rules of Differentiation

$$\text{i) } f'(x) = 0$$

$$\text{ii) } f'(x) = nx^{n-1}$$

$$\text{iii) } cf'(x) = cf'(x)$$

$$\text{iv) } f(x) \pm g(x) = f'(x) \pm g'(x)$$

$$\text{v) } f'(x) = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\text{vi) } f'(x) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{[v]^2}$$

$$\text{vii) Chain rule: } \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$\text{viii) General power rule: Derive } [f(x)]^n = n[f(x)]^{n-1} f'(x)$$

2. Basic Rules of Integration

$$\text{i) } \int k \, du = ku + C$$

$$\text{ii) } \int u^n \, du = \frac{u^{n+1}}{n+1} + C$$

$$\text{iii) } \int k f(u) \, du = k \int f(u) \, du$$

$$\text{iv) } \int [f(u) \pm g(u)] \, du = \int f(u) \, du + \int g(u) \, du$$